

REMARKS

This is a response to the Office Action mailed June 30, 2004. The Office Action objected to the figures and the specification, rejected claims 1-9, 11, 13-26 under 35 U.S.C. §102, and rejected claims 10 and 12 under 35 U.S.C. §103(a). Claim 16 has been amended. Claims 1-26 remain pending in the application.

Reconsideration in light of the amendments and remarks made herein is respectfully requested.

In the Drawings

The Office Action objected to the Figure 3 because reference number "405" is shown but not mentioned in the description. Applicants herewith submit a replacement Figure 3 removing the reference number "405".

The Office Action objected to the Figure 4 because reference number "400" is shown but not mentioned in the description. Applicants submit that the reference number "400" is disclosed in the specification in paragraph [0047] - "In other implementations, the routing scheme shown in Fig. 7 may also be implemented by interconnecting solder balls along a single column (e.g., one of the outer columns in semiconductor package 400) across multiple chip-scale package layers."

The Office Action objected to the Figure 5 because reference number "503" is shown but not mentioned in the description. Applicants herewith submit a replacement Figure 5 removing the reference number "503".

No new matter has been added. Applicants respectfully request that the objections to the Figures be withdrawn.

In the Specification

The Office Action objected to the specification because of informalities related to mislabeled references.

To correct these informalities Applicants have amended the specification as follows. In paragraph 34, "solder balls 306" has been replaced with "solder balls 308". In paragraph 35, "pads 308" has been replaced with "pads 306". In paragraphs [0040] and [0041] the references "602-612" have been replaced with "602, 604, 606, 608, 610, and 612". In paragraph 46, the reference "701" has been replaced with "701a-d".

Applicants respectfully request that the objections to the specification be withdrawn.

Rejections Under 35 U.S.C. § 102

The Office Action rejected claims 1-6, 8, 9, 11, 13, and 14 under 35 U.S.C. §102(b) as being anticipated by Kelly et al. (U.S. Pat. No. 5,798,567).

Applicants traverse this rejection in its entirety.

As to independent claim 1, the Office Action states that Kelly et al., Figures 4 and Col. 3, lines 23-31, teaches "the substrate (43) having a coefficient of expansion that substantially matches a coefficient of expansion of the memory die (41)" and (41)" and "each pad electrically coupled to one or more of the plurality of solder balls in a staggered routing scheme."

Applicants submit that Kelly et al. does not teach "the substrate having a coefficient of expansion that substantially matches a coefficient of expansion of the memory die" as claimed. In particular, Kelly et al. makes no mention of the coefficient of expansions of the substrate and the memory die. Thus, Kelly et al. fails to teach this claimed limitation.

Applicants also submit that Kelly et al. fails teach "each pad electrically coupled to one or more of the plurality of solder balls in a staggered routing scheme" as claimed. In particular, the Office Action does not point to any staggered routing scheme disclosed by Kelly et al. Kelly et al. merely teaches electrical connections between solder balls (49) and electrical pads 56. However, this does not constitute a staggered routing scheme as illustrated in Figures 3 and 7 of the present application.

As to dependent claims 3 and 9, the Office Action states that Kelly et al., Col. 3, lines 23-31, teaches the "substrate includes a controlled thermal expansion material that sufficiently matches the coefficient of expansion of the memory die." However, Applicants submit that Kelly et al. is silent as the thermal expansion properties of the substrate and memory die.

As to independent claim 5, Applicants again assert that, like claim 1, Kelly et al. fails to teach the limitation of "each pad electrically coupled to one or more of the plurality of solder balls in a staggered routing scheme" as claimed. Nowhere does Kelly et al. teach a staggered routing scheme as illustrated in Figures 3 and 7 of the present application.

As to dependent claim 8, the Office Action states that Kelly et al. teaches "the combined distance that an electrical component and the semiconductor device protrude from the substrate is less than the distance that a solder ball and pad protrude from the substrate." Applicants submit that Kelly et al. fails to teach this physical relation between the claimed components. It is important to note that the spacing between substrates is determined by the height of the solder balls and pads to permit an electrical component and semiconductor device to fit between substrates. Kelly et al. fails to teach the relationship between the substrate spacing and the electrical component and semiconductor device as claimed.

Applicants respectfully request that the Examiner withdraw the rejection of claims 1-6, 8, 9, 11, 13, and 14 under 35 U.S.C. §102(b) as being anticipated by Kelly et al. (U.S. Pat. No. 5,798,567).

The Office Action also rejected claims 1-9, 11, and 13-26 under 35 U.S.C. §102(e) as being anticipated by Li et al. (U.S. Pat. No. 6,597,062).

Applicants traverse this rejection in its entirety.

As to independent claims 1, 5 and 15, and dependent claim 21, the Office Action states that Li et al., Col. 7, lines 8-21, teaches "each pad electrically coupled to one or more of the plurality of solder balls in a staggered routing scheme."

Applicants respectfully submit that Li et al. fails to teach "each pad electrically coupled to one or more of the plurality of solder balls in a staggered routing scheme" as claimed. Applicants submit that the Office Action fails to point out, and Li et al. makes no mention of, a staggered routing scheme as illustrated in Figures 3 and 7 of the present application. In particular, Li et al. fails to disclose that the electrical interconnects between pads and solder balls are staggered in the manner claimed.

As to independent claim 20, and dependent claim 16, the Office Action states that Li et al., Figure 3b, teaches "the plurality of chip-scale packages arranged in a stacked configuration and having identical routing traces on a first surface and opposite second surface of the chip-scale package."

Applicants submit that Fig. 3b of Li et al. does not teach identical routing traces on each of the stacked configurations. A close study of Fig. 3b indicates that the routing traces on 51a,

51b, and 82 are different from each other. Thus, Li et al. fails to teach this limitation which reduces the cost of making a stacked assembly in the present invention.

As to dependent claim 22 the Office Action states that Li et al., Figures 3a and 3b, teach "the staggered routing scheme permits accessing the same underside coupling members in all of the chip-scale packages in a stack from a plurality of solder balls in a first chip-scale package."

Applicants submit that Figs. 3a and 3b of Li et al. do not teach the claimed staggered routing scheme that permits accessing the same underside coupling member in all of the chip-scale packages in a stack from a plurality of solder balls in a first chip-scale package as claimed and illustrated in Figures 3 and 7 (see references 711, 713, 717, and 719). In particular, Li et al. Fig. 3a does not teach any routing scheme and Fig. 3b only teaches a single trace (84), not a staggered routing scheme as claimed.

Applicants respectfully request that the Examiner withdraw the rejection of claims 1-9, 11, and 13-26 under 35 U.S.C. §102(e) as being anticipated by Li et al. (U.S. Pat. No. 6,597,062).

Rejections Under 35 U.S.C. § 103

The Office Action rejected claims 10 and 12 under 35 U.S.C. §103(a) as being anticipated by Li et al. (U.S. Patent No. 6,597,062) in view of Hosomi (U.S. Pat. No. 6,740,981).

Applicants traverse this rejection in its entirety.

While Applicants disagree that the cited prior art teaches the claimed elements, this argument need not be reached. In view of the arguments above distinguishing independent claim

5 from the cited prior art, Applicants submit that independent claim 5 and dependent claims 10 and 12 are in condition of allowance.

CONCLUSION

In view of the amendments and remarks made above, it is respectfully submitted that the pending claims are in condition for allowance, and such action is respectfully solicited. Authorization is hereby given to charge our Deposit Account No. 19-2814 for any charges that may be due. Furthermore, if an extension is required, then Applicants hereby request such an extension.

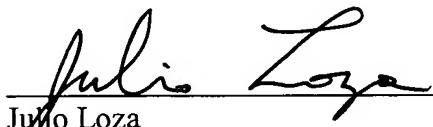
Respectfully submitted,

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I hereby certify that this document is being deposited on August 17, 2004 with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313

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